

ABSTRACT

Currently, the development of an inexpensive, convenient, portable, and digitized device for recording ionizing radiation is very relevant.

The topic of the master's thesis is related to the effective determination of the level of environmental pollution, which directly affects the quality of life. The level of radioactive background is one of the indicators that require constant monitoring. The impact of ionized particles on the human body may appear after a long time, then control may no longer be relevant.

In connection with the discovery of new technologies - appears to improve existing systems, reduce the cost of the device, increase the level of accuracy, and increase the level of speed.

In this project, a device based on a Geiger counter and a signal-processing algorithm for pulse separation and radiation dose calculation was developed. The device registers radiation, and transmits the data to a smartphone, the developed application analyzes the data, calculates the values of doses, and visualizes the information. The developed system determines the accumulated dose and notifies the user if the value of the equivalent dose is exceeded. The improved algorithm of signal processing allows for reducing the time of notification of the user in the event of an increased radiation dose.

The purpose and objectives of the research

The purpose of the research is to improve the method of the signal processing algorithm and optimize the dose calculation processing algorithm to increase the speed

On the way to achieving the set goals, the following tasks were solved:

- 1) Analysis of all existing methods of recording ionizing radiation
- 2) Improvement of the algorithm for calculating the dose value based on the measured pulses
- 3) Analysis of the signal processing algorithm.

4) Development of an automated system for registering the power of the equivalent dose of ionizing radiation.

The object of the research is the optimization of the signal processing algorithm in the system of automated monitoring of ionizing radiation.

The subject of research is methods of measuring ionizing radiation.

Research methods are based on the theory of ionizing radiation, processing of received signals from the device, algorithms for calculating dose values relative to registered pulses

The scientific novelty of the obtained results

1) The algorithm for calculating the radiation dose relative to registered pulses from a Geiger counter has been improved.

The practical significance of the results of the dissertation

1) An automated device for recording the level of ionizing radiation and a program for data processing and visualization have been implemented

Keywords

Measurement of the level of ionizing radiation, gas meters, process automation, and dose calculation algorithm.